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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,138	01/22/2004	Robert Vincent	BOW1335-048	6409

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EXAMINER	
FERNANDEZ, SUSAN EMILY	
ART UNIT	PAPER NUMBER
1651	

DATE MAILED: 12/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/763,138	VINCENT, ROBERT	
	Examiner	Art Unit	
	Susan E. Fernandez	1651	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-17 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-17 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 22 January 2004 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

The preliminary amendment filed January 22, 2004, has been received and entered.

Claims 1-17 are pending and are examined on the merits.

Drawings

The drawings are objected to because they are illegible. Specifically, Figures 1, 6-8, 11-14 are difficult to read. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Figure 8 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. Figure 8 is taken from Green (2003, http://www.ucd.ie/~app-phys/stuart/MODEL.HTM, The Effect of Chlorophyll Concentration on Airborne Hyperspectral

Reflectance) and is cited in the application (page 45, line 00185). See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

A series of singular dependent claims is permissible in which a dependent claim refers to a preceding claim which, in turn, refers to another preceding claim. Claims 4 and 5 are objected to because they refer to a later claim, claim 6.

A claim which depends from a dependent claim should not be separated by any claim which does not also depend from said dependent claim. It should be kept in mind that a dependent claim may refer to any preceding independent claim. In general, applicant's sequence will not be changed. See MPEP § 608.01(n).

Furthermore, claims 4 and 5 are objected to because of the following informalities: each claim does not end in a period. Appropriate correction is required.

Applicant is advised that should claim 10 be found allowable, claim 13 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing,

despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2-9, 11, 12, 14, and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 6 and 7, dependent on claim 1, refers to "the calculated value of phycocyanin" which is not determined in claim 1. Claim 1 only indicates that an algorithm is applied to relate the approximate amount of phycocyanin to the respective amount of light, but does not indicate that a calculation should be performed to obtain a value. Claims 8 and 9 also indicate a "calculated value" though no calculation is required in claims 1, 5, or 6. Additionally, it is unclear what is meant by "the calculated value of phycocyanin". The "value" may not be in reference to an amount.

Claims 4 and 5 list variables (such as X, K_1, and K_2) not described in claims 6 or 1, which they depend on. The purpose of these variables is not given as a mathematical equation is not provided. Claims 4 and 5 refer to X as "the amount of phycocyanin algae…" while claim 6 indicates a "calculated value of phycocyanin" and "the actual measured amount of said phycocyanin". Does X refer to the "calculated value" or the "actual measured amount"?

Claims 2, 3, 12, 14, and 15 specify that variables R31, R41, R43, R53, R73, and R74 are each the value of a LANDSAT TM band divided by another after subtraction for atmospheric haze separately in each band. However, it is not clear what property of each LANDSAT TM band or atmospheric haze is involved in the algorithm.

Finally, claims 4 and 5 do not end with periods. It is unclear where the claim ends or if there was a typographical error.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 4-11, 13, 16, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richardson (1996, Bioscience, Vol. 46, No. 7, pgs 492-501) in view of O'Mongain et al. (US Pat. 6,028,663), and further in view of Gitelson et al. (1995, Journal of Phycology, Vol. 31, No. 5, pgs. 828-834).

Richardson discloses that several research groups have used various remote sensors, including Landsat TM, for the detection of algae and photosynthetic bacteria according to the reflectance spectra (pages 494-495, particularly Figure 2). Furthermore, Table 3 on page 498 lists the frequency ranges used with various remote sensors, where band widths of the Landsat-5

remote sensor are the same as those listed in claim 1 and 16. By use of satellites such as the Landsat-5 and SeaWiFS sensors, transmittal of data occurs, where the reflectance data is related to the approximate amount of phycocyanin. Figures 2 and 3 demonstrate the generation of a report of approximate amounts of phycocyanin apparent by the peaks of the reflectance spectra.

Richardson does not expressly disclose application of an algorithm to relate reflectance to the amount of phycocyanin-pigmented algae or bacteria in water.

O'Mongain discloses a photometric analysis method for water suspensions where spectra are obtained of light transmitted and absorbed. The invention allows for the estimation of blue-green algae level from the height of the phycocyanin pigment peak (column 3, lines 8-10 and column 12, lines 39-42). Furthermore, a fitting algorithm is used for phycocyanin presence, where approximate amount of phycocyanin is related to amounts of light (column 8, lines 18-45).

Gitelson discloses the creation of algorithms for remote estimation of biomass and pigment concentration in cyanobacteria. Reflectance data was used for phycocyanin estimation and biomass estimation. The error in pigment estimation was found to be less than 0.80 mg/L, showing a high correlation value between calculated and actual pigment concentrations.

At the time the invention was made, a person of ordinary skill in the art would have recognized that the methods of O'Mongain and Gitelson would have been suitably applied to the data obtainable by Richardson and thereby provided an appropriate quantification of phycocyanin and biomass quantities.

One of ordinary skill in the art would have been motivated to do this since O'Mongain and Gitelson provide a reasonable expectation that the data obtainable by the methods reviewed by Richardson could be used to quantify phycocyanin and biomass amounts in large bodies of

water. It provides a more accurate approach for accomplishing the goal described in Richardson of assessing algal population dynamics.

Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richardson, O'Mongain et al. and Gitelson et al as applied to claims 1, 4-11, 13, 16, and 17 above, and further in view of the Landsat 7 Science Data Users Handbook (http://ltpwww.gsfc.nasa.gov/IAS/handbook/handbook_htmls/chapter8/chapter8.html, last updated on August 7, 2001, accessed December 16, 2004).

As indicated above, Richardson discloses the detection of algae and photosynthetic bacteria according to reflectance spectra obtained from remote sensors, and states the use of a Landsat TM sensor for this purpose. Richardson does not expressly disclose application of an algorithm to relate reflectance to the amount of phycocyanin-pigmented algae or bacteria in water. Furthermore, it does not specifically disclose the measurement of Landsat TM bands 1, 3, 4, 5, and 7, nor does it disclose an algorithm $X \approx K_1 - K_2 \times (R31) + K_3 \times (R41) - K_4 \times (R43) - K_5 \times (R53) + K_6 \times (R73) - K_7 \times (R74)$.

As indicated above, O'Mongain discloses a photometric analysis method for water suspensions where spectra are obtained of light transmitted and absorbed. The invention allows for the estimation of blue-green algae level from the height of the phycocyanin pigment peak as well as a fitting algorithm wherein the approximate amount of phycocyanin is related to amounts of light.

As described above, Gitelson discloses the creation of algorithms for remote estimation of biomass and pigment concentration in cyanobacteria.

The Landsat 7 handbook discloses the wavelength limits of the Landsat 5 TM bands (Table 8.1.1). Here, the bandwidth ranges are of the same frequency ranges as those given in

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to apply the methods of O'Mongain and Gitelson to quantify cyanophyte population dynamics and pigment concentrations to data presented in Richardson. It would have been obvious that the Landsat TM sensor would be ideal for measuring light in the five frequency ranges described in the claims since they fall exactly within the sensor's bandwidths. Because the Landsat TM sensor is used, it is evident that parameters dealing with this sensor should be used in an algorithm for biomass concentration calculations. Such an algorithm is obtainable by multiple linear regression well known in the field of mathematical modeling.

One of ordinary skill in the art would have been motivated to do this because O'Mongain and Gitelson provide more accurate methods of assessing algal population dynamics as described in Richardson. Any algorithm for modeling a biological system would involve instrument parameters and would take into account interference (in this case, atmospheric haze).

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Susan E. Fernandez whose telephone number is (571) 272-3444. The examiner can normally be reached on Mon-Fri 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Wityshyn can be reached on (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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